

*Note on the Shell-structure of certain Naiades.*

By C. A. WHITE, M.D.

Those who have given attention to fossil Lamellibranchiates cannot fail to have observed that, whenever the shell-substance is preserved at all, it is universally thin, even in large specimens—too thin, indeed, to have given sufficient protection to the mollusk which it enclosed. It seems evident, therefore, that some portion of the shell-substance must have disappeared during the process of fossilization. Thus those fossil shells which possess a prismatic outer layer usually have this layer alone preserved, at least when they occur in calcareous strata. Numerous specimens of *Myalina subquadrata* from the Upper Coal-measures, and *Inoceramus problematicus* of the Cretaceous of Western Iowa, illustrate this well, in which the interior markings are uniformly obliterated. While lately examining the Naiades of the Iowa river I observed that they all possessed a prismatic outer layer of a character not distinguishable from that of *Myalina subquadrata*. The prisms are of about the same size in each; but those of the *Inoceramus* are nearly twice as large.

The following species have thus far been found to possess the characters referred to:—*Unio alatus*, Say, *U. cornutus*, Barnes, *U. crassus*, Say, *U. ebenus*, Lea, *U. plicatus*, Say, *U. rectus*, Lam., *U. securis*, Lea, *U. tuberculatus*, *U. ventricosus*, Barnes, *Alasmodonta complanata*, Barnes, *A. truncata*, Say, and an undetermined species of *Anodonta*.

This comprises all the genera (or subgenera) found in our region; but it is not improbable that the prismatic structure is common to the whole family. The prismatic layer is of about the same thickness in all, the *Anodontas* and *Alasmodontas* being thinned at the expense of the inner or structureless layers; it is from half a millimetre to more than a millimetre in thickness, the epidermis resting directly upon it. Except in very old specimens, this layer constitutes the whole thickness of the shell for the width of a couple of millimetres from the margin; and in very young specimens it exclusively occupies about half the space between the margin and the pallial line.

The prismatic structure may be detected by the naked eye, and can be well studied by the use of one of Tolles's  $\frac{3}{4}$ -inch triplet lenses. Under this magnifier the inner surface of the marginal border is seen to be finely granular, each granule being the convex end of one of the prisms which constitute the layer. These prisms extend through the layer to the epidermis without interruption, reminding one, in their appearance upon fracture, of certain species of *Chætetes*. But viewing the prisms upon their ends they are seen to vary in size much more than the cells of *Chætetes* do, and consequently to lack that uniformity in cross section presented by the coral.

If our Naiades were fossilized under the same circumstances that

the Coal-measure and Cretaceous shells before mentioned have been, even the most massive *Unios* would doubtless be found with as thin a shell as *Myalina* and *Inoceramus* now possess.

Mr. F. B. Meek's investigations have shown that the prismatic structure is a very common (if not a constant) character of the fossil *Aviculidæ*; and it is doubtless of much value as a family character; but since it is also seen in certain genera of *Mytilidæ* and the *Naiades*, it is known that it is not the peculiar property of any family.—*Silliman's American Journal*, May 1868.

#### *Smelts breeding in an Aquarium.*

Mr. Brightwell, passing through the Norwich fish-market the other day, had his attention called by a man to his aquarium, in which he found some smelts, caught in the river, were kept alive. They had deposited spawn on the stones at the bottom; and the young fry had emerged, so exceedingly minute as scarcely to be seen, but distinguishable as young smelts. They make excellent microscopical objects.—L. B.

#### *On the Formation of Coral Reefs.* By CARL SEMPER.

The well-known annular form of the reefs containing lagoons, the *atolls*, was formerly explained by supposing that the polypes had built their dwellings, perpendicularly upwards, upon the margins of the craters of submarine volcanos, by which an external ring (an outer reef) must necessarily be produced, closing the crater, now become a lake, against the outer sea. In this, however, the allied forms of the *barrier reefs* (that is to say, such as fringe elevated islands lying in the sea) and the *coast reefs* occurring in all tropical seas were not taken into consideration. Darwin, by his theory, brought the three forms into mutual connexion. He thought he could demonstrate that the atolls and barrier reefs could only be explained by the assumption of the gradual *sinking* of a continent or island, and the coast reefs by an *elevation* of the shores. Although he himself called attention to some difficulties, he believed he could support the value of his theory in opposition to such obstinate facts, especially by demonstrating how in general the *coast reefs* were formed only on shores now in course of elevation, the *atolls* and *barrier reefs*, on the contrary, in regions of the sea in which the want of all active volcanic energy indicates a depression.

Nevertheless cases do occur which cannot be explained thus. Leaving out of consideration the Philippines, where several atolls are found in the midst of islands in course of elevation, the western Caroline Islands, the Pelew Islands, furnish a very striking example of an association of extreme forms. At the north of the chain of islands (which stretches nearly north and south, and is about sixty geographical miles in length), there are true atolls; in the middle,